

Calamus caesius and *Calamus trachycoleus* Compared

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Summary

Two closely related rattan palms, *Calamus caesius* and *C. trachycoleus* are shown to have remarkably different habits; the silvicultural significance of the difference in habit is discussed.

Throughout the Lower Barito area of South Kalimantan, Indonesian Borneo, a rattan species receives intensive cultivation. This species, *Calamus trachycoleus*, is the only species cultivated on a large scale (i.e. thousands of hectares). It is closely related to *Calamus caesius* which also receives some degree of cultivation in the area and elsewhere. Though so similar to *Calamus caesius*, *C. trachycoleus* differs in one feature of its growth form; this difference has a major effect on the habit of the rattan and is one of the most important features of the species which has led to its ultimate supremacy as a plantation rattan. Holttum (1955) in his classic paper on growth forms of monocotyledons has indicated the importance of an understanding of the basic growth forms of monocotyledons; here is an example from the rattans where a difference in the degree of growth of one feature of a basically similar growth pattern differentiates between two species and accounts for the economic success of one over the other in cultivation.

DESCRIPTION OF THE GROWTH FORMS OF *CALAMUS CAESIUS* AND *C. TRACHYCOLEUS*

CALAMUS CAESIUS BLUME

This rattan is very widespread being found in Sumatra, the Malay Peninsula including Southern Thailand, and Borneo, at altitudes ranging from near sea-level in coastal peat swamp forest to 1000 m or more in the hills; the wide range may in part be due to the fact that it receives a rudimentary cultivation and is sometimes planted in primary forest near villages (Dransfield pers. obs. and hearsay from villagers in Borneo). It also seems to tolerate a great range of soil conditions from seasonally flooded alluvial clay soils, peat-swamp soils to well-drained steep soils on varying substrata in Hill Dipterocarp Forest. It is however commonest as a lowland plant on alluvial flats beside rivers. Throughout Borneo, the indigenous people often plant a few clumps of this and occasionally other species at the edge of their villages or near their longhouses. *Calamus caesius* without doubt produces the best quality small diameter class (7–15 mm) cane of all rattan species entering the rattan trade.

Calamus caesius produces rather dense clumps of many aerial stems, often more than 15 in number radiating from a condensed system of short underground rhizomes. Initial growth of the seedling produces an orthotropic stem about 1 cm in diameter including the leafsheaths. This seedling stem branches from the basal nodes to produce one to three sucker shoots which are also orthotropic; subsequent suckering from these sucker shoots produces short subterranean rhizomes c 3 cm in diameter and up to 10 cm long which bear pale brown scale leaves and short condensed internodes. Such rhizomes eventually (growth rates of the rhizomes are not known) metamorphose into rapidly growing orthotropic shoots of diameter 1.5–2.5 cm including the leaf-sheaths with lower internodes 50–100 cm or more

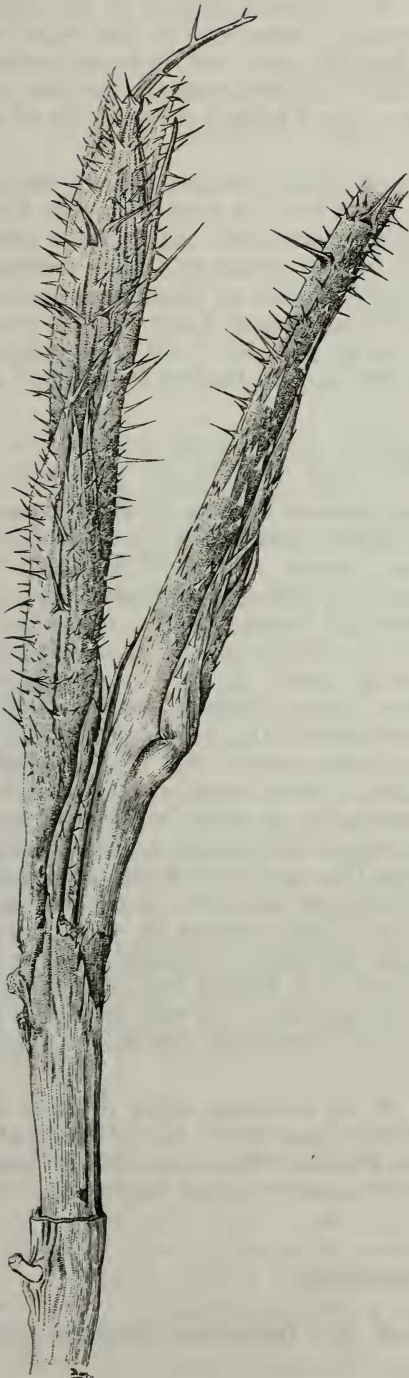
in length bearing at the base leaves with highly reduced laminae often consisting of rachis alone and long-sheathing bases. Subsequent leaves develop more and more leaflets until the adult leaf shape is attained with the rachis bearing 10 or more grouped leaflets on each side, the rachis tip terminating in a cirrus. As the rhizome metamorphoses into an orthotropic stem, the two nodes at the area of metamorphosis each develop a branch with the potential of continued rhizomatous growth though the potential may not always be realised. Some of the branches remain dormant as bulb-like shoots. As each rhizome grows into an aerial stem, there is the potential for replacement by two new rhizomes and hence exponential increase in the number of aerial stems in the clump. However, because of the shortness of the rhizomes, many of the potential new rhizomes become juxtaposed and squashed and in this condition remain as bulb-like dormant shoots as described above. Further development of these dormant shoots depends on the opening up of the clump either effected by death of orthotropic shoots or by clearance by man of debris during cultivation of this species (pers. comm. from villagers in Borneo).

CALAMUS TRACHYCOLEUS BECC.

This rattan is only known from South Borneo within the watersheds of the rivers flowing into the Java Sea — i.e. the Barito, Kapuas (Kalimantan Tengah), Kahayan, Mendawai, Sampit and Seruyan Rivers. In this area it is found growing on seasonally-flooded riverbanks on alluvial clays and the margins of swamp forest. It receives intensive cultivation in the Barito Selatan area upriver from Kuala



1. The base of a clump of *Calamus caesius* with most roots removed; note the short rhizomes, bulb-like dormant shoots, and the smaller diameter of the aerial shoots compared with that of the rhizomes. (Dransfield 3933, Sungei Jaya, Kalimantan Tengah, 4.2.1974)



2. A piece of a stolon ("selantar") of *Calamus trachycoleus* at the point of metamorphosis into an orthotropic; stem sheaths have been removed to show the production of two branches at the point of metamorphosis. Dransfield 3929, Sungei Jaya, Kalimantan Tengah 4.2.1974).

Kapuas on the Barito River, being grown in plantations on riverside seasonally-flooded alluvial soils. Though eminently successful as a plantation crop and in the wild, apparently, as a riverbank colonizer, it is unknown elsewhere in Borneo. *Calamus trachycoleus* produces a small diameter class cane (7–15 mm) with internodes generally shorter than those of *Calamus caesius* and of not quite such good quality; yet it accounts for about 80 per cent of the rattan trade on the Barito River.

Calamus trachycoleus is immediately distinguishable from *C. caesius* in producing diffuse open colonies rather than dense clumps; rather than having a condensed system of short underground rhizomes, it spreads by means of lax above-ground stolons. Initial growth of the seedling is similar to that of *C. caesius*, the first stem and one or two suckers being orthotropic. Subsequent branching results in robust stolons up to 4 cm in diameter which grow along the soil surface or slightly raised above ground level on short adventitious roots. The stolons (known locally as "selantar") bear sheathing pale brown scale leaves and short internodes 4–7 cm long and like the rhizome of *C. caesius* metamorphose into orthotropic stems. The length of the stolons from point of origin to point of metamorphosis may be 3 m or more. As in *Calamus caesius*, two branches are produced at the area of metamorphosis, one each from adjacent nodes, but unlike *C. caesius*, both branches grow out to produce new stolons unless damaged; no dormant branches have been observed and this is regarded as being correlated with the open growth of the clump and apparent lack of competition between the branches.

Each branch in *Calamus trachycoleus* is apparently adnate to the internodes of the proceeding leaf and is hence carried out of the scaleleaf axil; however their position suggests an axillary origin rather than an internodal or other anomalous origin. This feature of *Calamus trachycoleus* deserves anatomical investigation. Of the two branches produced at each metamorphosis, the proximal tends to develop before the distal and may be already 30 cm in length before the distal emerges

from the scale leaves. Because of distortion the proximal branch of the stolon appears to continue the growth of the subtending stolon and at first sight the orthotropic stem appears as the branch rather than the main axis. If young material is examined at a stage when a stolon tip begins to grow upwards, the two new stolons are seen to be branches rather than one of them being a continuation of the stolon.

Unlike *Calamus caesius*, *C. trachycoleus* is a rapidly invasive species and the potential of exponential increase in number of aerial stems is usually realised. Once a plantation of *C. trachycoleus* has been established very little cultivation is necessary and harvests can be made after an initial 7–10 year period at 2 yearly intervals. In *C. caesius* on the other hand, clumps require clearance of debris to encourage development of new shoots and in the Barito Selatan area of South Borneo at any rate, only two main harvests are obtained, an initial one after 7–10 years followed by a second after a further four years; after the second harvest the clumps are supposedly exhausted.

DISCUSSION

In his original description of *Calamus trachycoleus* Beccari (1913) comments that the rattan is allied to *C. caesius* but most closely related to *C. pogonacanthus*. Recent fieldwork in Borneo has allowed the present author to make several collections of *C. pogonacanthus* which is now seen to belong to a distinct group of species in *Calamus* all with the peculiar feature of bearing both a cirrus and a flagellum. Cirrus (barbed whip at the end of the leaf representing an extension of the leaf rachis) and flagellum (barbed whip borne on the leaf sheath and representing a sterile inflorescence) are the two major climbing organs found in Malesian rattans and are usually mutually exclusive. The presence of both in *C. pogonacanthus* and a few other species is hence noteworthy. *C. trachycoleus* bears a cirrus only and hence is here regarded as being more closely related to *C. caesius* than to *C. pogonacanthus*. Furthermore, in the field, without reference to the remarkable difference in habit, *C. caesius* and *C. trachycoleus* are distinguished with some difficulty — both species are about the same size, have very similar leaflet arrangement, and have white indumentum on the lower leaflet surfaces, though in *C. trachycoleus* it is sparse and usually only present on young leaves. The leaf sheath with its abundant minute thorns forming a scabridity between the sparse large triangular thorns in *C. trachycoleus* and lacking such scabridity in *C. caesius* is the only reliable character for distinguishing the two species in the herbarium; yet in the field the two are seen to be remarkably distinct because of their differing habits.

The striking differences in development of the suckering habit of these two rattans illustrates how important such differences may be to the silviculturalist; further studies of rattan suckering habits may produce other examples of closely related species differing in habit and are seen to be of great importance in a consideration of the ecology of rattans.

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